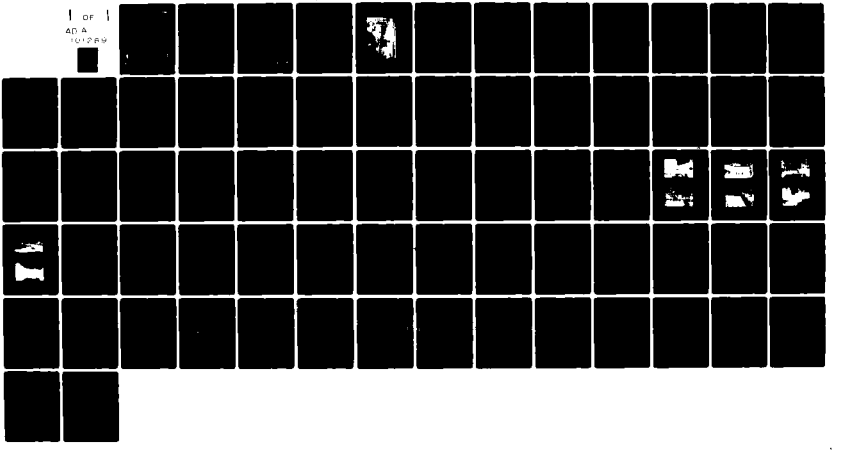
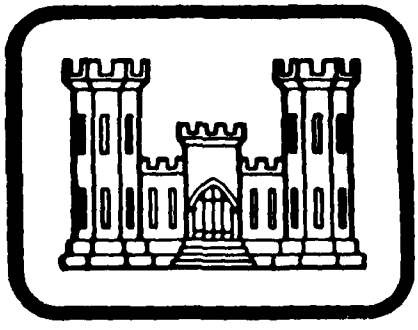
AD-A101 269 BERGER ASSOCIATES INC HARRISBURG PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. MILL DAM (NDI NUMBER PA-00711,--ETC(U)
JUN 81 H JONGSMA DACW31-81-C-0013
UNCLASSIFIED NL



DELAWARE RIVER BASIN
MILL DAM
COMMONWEALTH OF PENNSYLVANIA
WERNERSVILLE STATE HOSPITAL

NDI NO. PA-00711
DER NO. 6-295
BERKS COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



PREPARED FOR

DEPARTMENT OF THE ARMY

Baltimore District, Corps of Engineers

Baltimore, Maryland 21203

BY

Berger Associates

Harrisburg, Pennsylvania 17105

Contract DACW31-81-C-0013

JUNE 1981

PREFACE

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: MILL DAM

State & State No.: PENNSYLVANIA, 6-295

County: BERKS

Stream: HOSPITAL CREEK

Date of Inspection: NOVEMBER 5, 1981

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in good condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. These classifications indicate that the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this structure is the full PMF. The spillway capacity is adequate for passing 34 percent of the PMF peak inflow without overtopping the dam. Overtopping of the dam by the PMF will not cause failure. The spillway, therefore, is considered to be inadequate, but not seriously inadequate.

The following recommendations are presented for immediate action by the owner:

1. That the valve on the outlet pipe be maintained and operated at least once a year.

2. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

3. That provision be made to cut or remove the screen over the spillway in case of an emergency.

MILL DAM NDI NO. PA-00711 DER NO. 6-295

WERNERSVILLE STATE HOSPITAL BERKS COUNTY

4) That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

DATE: June 5, 1981

APPROVED BY:

JAMES W. PECK
Colonel, Corps of Engineers
Commander and District Engineer

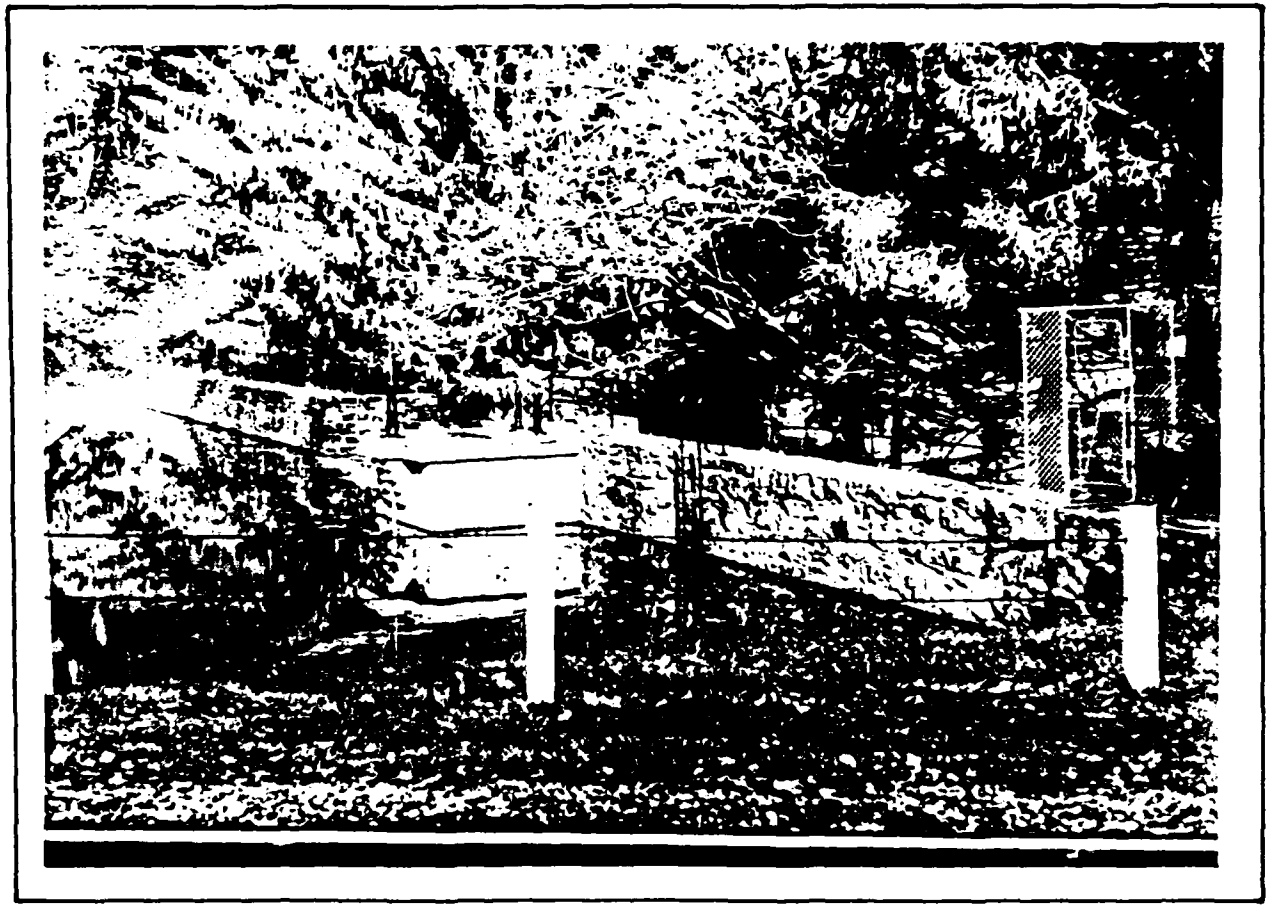
DATE: 17 June 1981

COMMONWEALTH OF PENNSYLVANIA
REGISTERED
PROFESSIONAL
HENDRIK JONGSMA
ENGINEER
No. 5557E
PENNSYLVANIA

National Dam Inspection Program. Mill Dam (NDI Number PA-00711, DER Number 6-295), Delaware River Basin, Commonwealth of Pennsylvania, Berks County, Pennsylvania. Phase I Inspection Report,

DACW31-81-C-0013

411003



OVERVIEW

MILL DAM

Photograph No. 1

TABLE OF CONTENTS

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

MILL DAM

NDI NO. PA-00711
DER NO. 6-295

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Mill Dam is a concrete gravity dam with a stone facing. The overall length of the structure is 248 feet, including a 40 foot wide spillway section. The height of the dam is 25 feet. The typical section of the dam has a vertical upstream face, a four foot wide crest, and a sloping downstream face. The modified ogee spillway is located near the center of the dam.

The intake structure is located to the right of the spillway on the upstream side of the dam. A sliding gate controls the flow from the reservoir into a well through a 36x36 inch opening. From this well two outflow pipes are controlled with valves. A 24-inch pipe provides the drawdown facility, and an 8-inch pipe leads downstream to the hospital grounds for fire protection.

The downstream channel of the spillway has new concrete walls and a weir has been installed forming a stilling basin. This stilling basin is occasionally used as a swimming pool by the residents of the hospital.

B. Location: South Heidelberg Township, Berks County
U.S.G.S. Quadrangle - Sinking Springs, Pa.
Latitude 40°-19.7', Longitude 76°-06.7'
Appendix E, Plates I & II

C. Size Classification: Small: Height - 25 feet
Storage - 24 acre-feet

D. Hazard Classification: High (Refer to Section 3.1.E.)

E. Ownership: Commonwealth of Pennsylvania
Wernersville State Hospital
Wernersville, PA 19565
Mr. I.G. Werner, Maintenance Superintendent

F. Purpose: Recreation & Fire Protection

G. Design and Construction History

The design was prepared in 1935 and revised in 1936 by a Mr. R.A. Bicking. The date 1936-1937 is engraved on the dam and this date is presumably the construction date. There are no records of construction, and it is unknown who the contractor was.

H. Normal Operating Procedures

There are no operating procedures for these facilities. All inflow is discharged over the spillway. The reservoir is used for boating and fishing, and a normal pool level is desired for these purposes. To prevent boats from going over the spillway, a mesh screen has been installed between the spillway abutments.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	2.52
Computed for this report:	2.52

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations.

Maximum known flood (estimated from U.S.G.S. gage data for nearby Stoney Run)	756
Outlet works at pool Elev. 486	59
Outlet works at low pool Elev. 476	34
Spillway capacity at pool Elev. 491.0 (low point of dam)	1735

C. Elevation (feet above mean sea level)

Top of dam (low point)	491.0

Top of dam (design crest)	491.0
Spillway crest	486.0
Upstream portal invert	473
Downstream portal invert	470
Streambed at downstream toe of dam (estimate)	466.0
Foundation elevation (design max.)	460.±

D. Reservoir (miles)

Length of normal pool (Elev. 486)	0.1
Length of maximum pool (Elev. 491)	0.1

E. Storage (acre-feet)

Spillway crest (Elev. 486)	12.9
Top of dam (Elev. 491)	24

F. Reservoir Surface (acres)

Spillway crest (Elev. 486)	1.6
Top of dam (Elev. 491)	3.2

G. Dam

Refer to Plates III and IV in Appendix E for plan and section.

Type: Concrete gravity with stone facing.

Length: 248 feet.

Height: 25 feet.

Top Width: Design - 4 feet; Survey - 4 feet.

Side Slopes:

	Design	Surveyed
Upstream	Vertical	Vertical
Downstream	1H to 2V	1H to 2V

Zoning: Not applicable.

Cutoff: Excavated to impervious material.

Grouting: Not reported.

H. Outlet Facilities

Type:	Wet well at upstream toe, inlet is 36-inch square orifice, outlets are 24-inch blowoff pipe and 8-inch water supply pipe.
Control:	Inlet - 36-inch square sluice gate. Outlet - 24-inch valve on blowoff line; 8-inch valve on water supply line.
Location:	Right side of spillway.

I. Spillway

Type:	Uncontrolled, masonry ogee section.
Location:	Center of dam.
Length of Weir:	40 feet.
Crest Elevation:	486

J. Regulating Outlets

See Section 1.3.H. above.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering data for Mill Dam is limited to one design drawing. This drawing has been reproduced on two plates in Appendix E. Parts of this drawing indicate that a previous dam was located on the site of the present dam with an approximate crest elevation of 487. That dam consisted of an earthfill between two stone walls. Plate III indicates that the previous reservoir was cleaned of siltation material. The spillway was designed for a discharge capacity of 1165 cfs, leaving one foot of freeboard.

2.2 CONSTRUCTION

Records of construction are not available. A date, 1936-1937, is located on top of the dam. This indicates the construction period. There are no indications that test borings were drilled at this site. There are no as-built drawings to indicate the constructed foundation elevations.

2.3 OPERATION

Formal records of operation are not maintained by the owner. Maximum discharges over the spillway are not recorded.

2.4 EVALUATION

A. Availability

The available engineering data is contained in the files of PennDER, Harrisburg, Pennsylvania.

B. Adequacy

The available engineering data, combined with the field inspection, are considered to be adequate for making a reasonable assessment of the dam.

C. Operating Records

Operating records, including maximum pool levels, have not been maintained.

D. Post Construction Changes

Records of post construction changes are not available. However, it is apparent that a railing and entrance gate have been

installed on the top of the dam and that a protective screen was installed across the spillway. The stone walls along the spillway discharge channel have been replaced with concrete walls. The existing stilling basin has a concrete slab.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Mill Dam is very good. The dam and surrounding area are well maintained and there were no signs of serious deterioration or instability. Some moisture was apparent through the downstream masonry facing, but this was not considered to be serious at the present time. The reservoir is used for boating and fishing, and the stilling basin is occasionally used for swimming. An 8-inch line from the reservoir is connected to a fire protection system on the hospital grounds.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during the inspection, are presented in Appendix A of this report. Photographs of the facilities taken during the inspection are reproduced in Appendix C.

Mr. Dowson Wolfe represented the owners and accompanied the inspectors on the day of inspection.

B. Gravity Dam

The concrete gravity section is faced with masonry and has an excellent appearance. The crest is four feet wide and is provided with a pipe railing and an entrance gate (Photograph No. 1). The right abutment ties into the right hillside, which has been excavated for a roadway (Photograph No. 2). The left abutment ties into a steep wooded slope. Both abutments appear to be solid.

The downstream face has some wet spots close to the downstream toe. No major seepage was noticed, and no cracks from frost damage were detected. The wet condition is not considered to be serious at the present time.

The horizontal alignment of the dam is straight. The surveyed profile is five feet above the spillway crest.

C. Appurtenant Structures

The 40 foot wide spillway is located near the center of the dam and consists of a modified concrete ogee section. Siltation was measured at 11 feet below the spillway crest at the vertical upstream side. The sloped downstream face has weathered (Photograph No. 4); however, there were no visible cracks of serious nature. Stone abutment walls guide the overflow to the center of the stilling basin. The stilling basin has low concrete walls and a concrete slab. The end of the stilling basin has a concrete capped stone wall forming a pond. A small gate in this wall permits draining of the pool.

The intake structure is a masonry wet well constructed at the upstream side of the wall on the right side of the spillway. An upstream slide gate controls the flow from the reservoir into this structure. This gate is always left in open position, and therefore, the structure functions as a wet well. A short 24-inch pipe leads from the wet well to the stilling basin and an 8-inch line is connected to the fire protection lines for the hospital grounds. Both pipes have an upstream valve control and all controls are located on the top of the dam (Photograph No. 3). The 24-inch outlet valve was operated on the day of inspection.

D. Reservoir Area

The reservoir is surrounded by steep wooded slopes. Mr. Wolfe, the owner's representative, stated that the reservoir requires cleaning of sedimentation every 2 to 3 years. The drainage area is wooded.

E. Downstream Channel

The immediate downstream channel of Mill Dam is a well defined channel with stone walls (Photographs No. 6 & No. 7). A bridge across the stream is located about 380 feet downstream from the dam. The stream flows through a flat area with many of the hospital buildings close to the stream. A potential hazard to loss of life exists downstream if the dam fails. The possible loss of lives would be more than a few. The hazard category for Mill Dam is considered to be "high."

3.2 EVALUATION

The overall visual evaluation of Mill Dam indicates that the facilities are in good condition. The dam has a well maintained appearance. There were no indications of cracks, movement or instability.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

Mill Dam and the reservoir were constructed for use as a recreational facility and for fire protection. The reservoir is maintained at the normal pool level (top of spillway). All inflow is discharged over the spillway. The drawdown facility is used to lower the pool level for maintenance of the reservoir.

4.2 MAINTENANCE OF DAM

The stone faced dam is in excellent condition and does not require maintenance.

4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities are the two valves located in a wet well. These valves are operated occassionally, and there is no program for regular maintenance of the facility.

4.4 WARNING SYSTEM

There is no formally organized surveillance and downstream warning system in existence at the present time.

4.5 EVALUATION

The operational procedures for Mill Dam are minimal. It is recommended that a program be developed for regular maintenance of the valves, which should include the greasing and operation of the drawdown valve on a regular basis. A formal surveillance plan and downstream warning system should be developed for implementation during periods of heavy or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analysis available from PennDER for Mill Dam was not very extensive. No area-capacity curve, frequency curve, unit hydrograph, design storm, design flood hydrograph, or flood routings were available. A note on a drawing in the PennDER file indicates that the spillway was designed for a flow of 1165 cfs with one foot of freeboard.

B. Experience Data

There are no records of flood levels at Mill Dam. Based on records of the U.S.G.S. stream gage on Stoney Run at nearby Reamstown, Pennsylvania, the maximum inflow to Mill Dam is estimated to have occurred in June 1972. The estimated inflow of 756 cfs was passed without reported difficulties.

C. Visual Observations

On the date of the inspection, no conditions were observed that would indicate that the appurtenant structures of the dam could not operate satisfactorily until the dam is overtopped. Just upstream of the weir crest is a 6" x 6" wire mesh screen five feet high and spanning across the entire spillway width. This screen could cause debris to accumulate and obstruct flow.

D. Overtopping Potential

Mill Dam has a total storage capacity of 24 acre-feet and an overall height of 23 feet above streambed. These dimensions indicate a size classification of "Small." The hazard classification is "High" (see Section 3.1.E.).

The recommended Spillway Design Flood (SDF) for a dam having the above classifications is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. Because of the hospital downstream of this dam, the recommended SDF is the full PMF. For this dam, the PMF peak inflow is 5083 cfs (see Appendix D for HEC-1 inflow computations).

Comparison of the estimated PMF peak inflow of 5083 cfs with the estimated spillway discharge capacity of 1735 cfs indicates that a potential for overtopping of the Mill Dam exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam does not have the necessary storage available to pass the full PMF

without overtopping. The spillway-reservoir system can pass a flood event equal to 34% of a PMF without overtopping based on the low point of the dam profile.

E. Spillway Adequacy

Calculations show that the spillway discharge capacity and reservoir storage capacity, based on the present low point in the dam profile, combine to handle 34% of the PMF (refer to Appendix D).

Since the total spillway discharge and reservoir storage capacity cannot pass the full PMF, and since overtopping of .8 foot, caused by one-half of the PMF, is not expected to cause a breach of this masonry structure, the spillway is considered to be inadequate, but not seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Gravity Dam

The visual inspection of Mill Dam did not detect any signs of structural instability. The stone facing is in excellent condition and cracks or displacements were not noticed. A very slight amount of seepage was noticed, but was limited to moist spots on the wall surface. The abutments with the hillsides were sound.

2. Appurtenant Structures

The spillway was in good condition, with only a slight weathering of the surface.

The emergency drawdown valve was easily operated on the day of inspection and was in apparent good condition.

B. Design and Construction Data

The design drawing indicates that the gravity concrete dam section has a height of 31 feet and a base width of 20 feet. The actual foundation elevation is unknown and is indicated as "impervious material" on the design drawing. The overburden is shallow, and it is therefore assumed that the indicated impervious material is bedrock. There are no indications that a shear key was constructed.

Stability calculations for the dam (Appendix F) indicate that the factor of safety against overturning with a full reservoir is 1.55. The resultant of the forces falls within the middle third of the footing.

Details of the appurtenant structures are sufficient and indicate that the present wet well can be closed off at the upstream side. Drawings indicate that this sliding gate was to be installed inside the tower. Photograph No. 3 shows, however, that the gate was installed on the outside upstream face of the tower. Records of construction, including actual foundation elevation, are not available.

C. Operating Records

Operating records for this dam have not been maintained by the owner.

D. Post Construction Changes

There are no indications that post construction modifications have been made to the dam or its appurtenant structures, with the exception of installing a handrail and an entrance gate.

E. Seismic Stability

This dam is located in Seismic Zone 1, and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection and the review of the construction drawings indicate that Mill Dam is in good condition. The gravity section appears to be stable and is considered to be adequate for the height of the dam under consideration. The small amount of seepage through the masonry wall is not considered to be serious.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the discharge of the spillway is sufficient to pass 34 percent of the PMF with the existing condition. Because this structure is a masonry gravity dam and can withstand the overtopping due to the SDF, the spillway is considered to be inadequate, but not seriously inadequate.

B. Adequacy of Information

The design information contained in the files, combined with the visual inspection, are considered to be sufficiently adequate for making a reasonable assessment of this dam.

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

Additional studies are not required at this time.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented for implementation by the owner:

1. That the valve on the outlet pipe be maintained and operated at least once a year.

2. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

3. That provision be made to cut or remove the screen over the spillway in case of an emergency.

4. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

APPENDIX A

CHECK LIST OF VISUAL INSPECTION REPORT

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 6-295 NDI NO. PA-00 711

NAME OF DAM Mill Dam HAZARD CATEGORY High

TYPE OF DAM Stone Masonry Gravity Dam

LOCATION South Heidelberg TOWNSHIP Berks COUNTY, PENNSYLVANIA

INSPECTION DATE 11/5/80 WEATHER Clear, sunny TEMPERATURE 40-50°

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma Dowson Wolfe (Hospital)

R. Shireman Richard Peace (DER)

A. Bartlett

NORMAL POOL ELEVATION: 486.0 AT TIME OF INSPECTION:

BREAST ELEVATION: 491 POOL ELEVATION: 486+

SPILLWAY ELEVATION: 486.0 TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: No records

GENERAL COMMENTS:

The appearance of this dam is very good. The area surrounding the dam is well kept. The reservoir is used for boating and fishing recreation by the patients. A swimming pool has been constructed in the stilling pool for the recreation of the patients. Some seepage was noted on the downstream masonry walls, but it is not serious.

NDI NO. PA-00 711

VISUAL INSPECTION
MASONRY DAM

	OBSERVATIONS AND REMARKS
A. SEEPAGE	Some moisture on downstream face, close to ground surface.
B. ABUTMENT JOINTS	Appear to be sound.
C. DRAINS	None.
D. WATER PASSAGE	Uncontrolled spillway section, 24-inch blowoff.
E. FOUNDATION	See Report, Section 6.1.B.
F. CONCRETE SURFACE	Stone facing--good condition.
G. STRUCTURAL CRACKS	None.
H. HORIZONTAL AND VERTICAL ALIGNMENTS	Good.
J. MONOLITH JOINTS	Masonry facing.
K. STAFF GAGE AND RECORDER	None.

NDI NO. PA-00 711

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	The intake structure is a stone masonry wet well constructed as a part of the dam. It is located to the right of the spillway and contains three operating gates & valves. One gate admits water into the wet well. One valve control operates the blow-off, and one control provides emergency fire protection. These
B. OUTLET STRUCTURE	gates are seldom operated. The outlet from the wet well is a 24-inch diameter pipe.
C. OUTLET CHANNEL	The outlet discharges directly into the stilling basin.
D. GATES	Three - One to wet well. One to blowoff pipe. One for emergency fire protection.
E. EMERGENCY GATE	Blow-off mentioned above. 24-inch pipe.
F. OPERATION & CONTROL	There is no regular or scheduled operation of these facilities. The blow-off valve was operated during this inspection.
G. BRIDGE (ACCESS)	Access to the control structure is directly from the breast of the dam.

NDI NO. PA-00 711

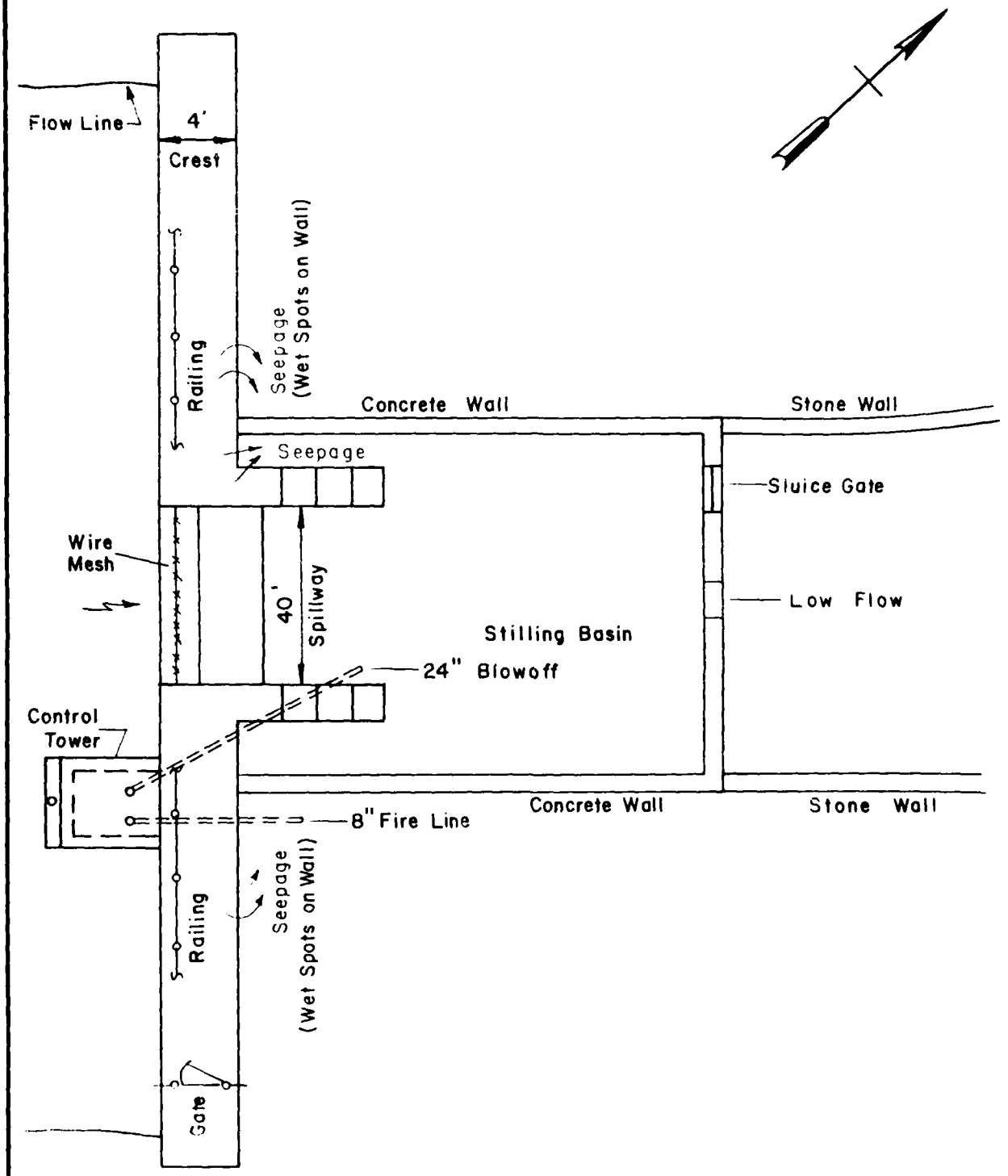
VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Approach is directly from reservoir. The dam spans the entire downstream section of the lake.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Concrete ogee section in good condition. A boat protection fence spans the spillway. Spillway walls are in good condition. No apparent distress of walls or spillway section. Some wet spots were observed on the downstream side of the dam on the wall. There was no flow and the condition is not considered serious.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Spillway discharges into a stilling basin which has been modified to serve as a swimming pool for the patients of the hospital. The walls are concrete. The initial stilling basin weir has been capped with concrete. A slot (28" wide x 48" deep) is located at the left side of the stilling basin weir. It contains an aluminum slide to allow control of the water level in the basin.
D. BRIDGE & PIERS	There are no bridges or piers in the immediate vicinity of the dam.
E. GATES & OPERATION EQUIPMENT	The spillway is uncontrolled.
F. CONTROL & HISTORY	No records.

NDI NO. PA-00 711

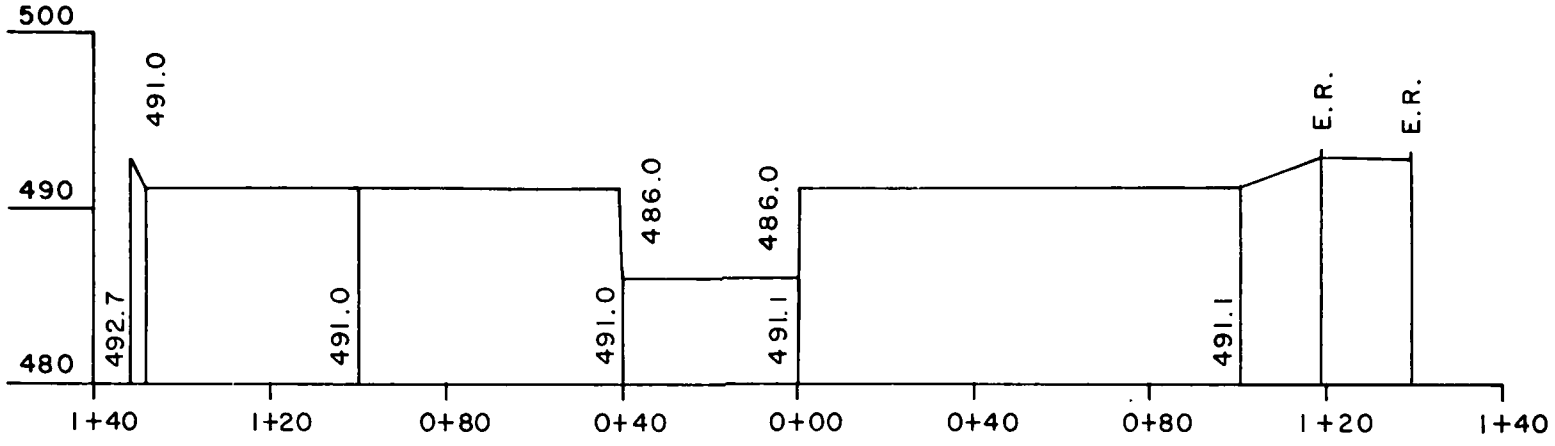
VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
INSTRUMENTATION	
Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR	
Slopes	Steep - 30-40°
Sedimentation	Occasional cleaning required - est. every 2 - 3 years.
Watershed Description	Woodlands.
DOWNSTREAM CHANNEL	
Condition	Downstream channel flows through the hospital grounds. Condition is good.
Slopes	Flat land, stable.
Approximate Population	Hospital grounds.
No. Homes	Hospital buildings.

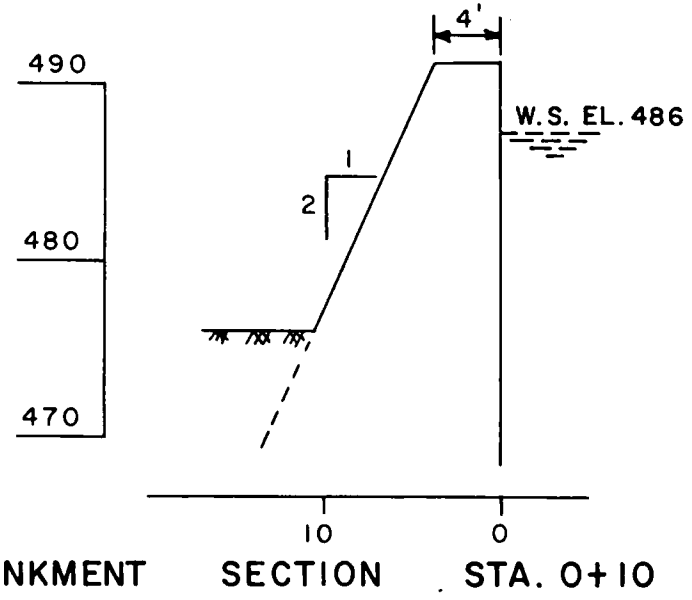


MILL DAM
PA-00711
INSPECTION SURVEY
PLATE A-I

SURVEYED 11-5-80



EMBANKMENT PROFILE LOOKING DOWNSTREAM



EMBANKMENT SECTION STA. 0+10

SURVEYED 11-5-80

MILL DAM
PA-00711

INSPECTION SURVEY

PLATE A-II

APPENDIX B

CHECK LIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 6-295 NDI NO. PA-00 711

NAME OF DAM Mill Dam

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Sinking Springs, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	Application for construction permit filed May 16, 1936. Assumed construction in 1936-1937.
GENERAL PLAN OF DAM	See Plate III, Appendix E.
TYPICAL SECTIONS OF DAM	See Plate IV, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	See Plate IV, Appendix E. None. None.

NDI NO. PA-00 711

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	N/A

NDI NO. PA-00 711

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	None, except placing of handrails and entrance gate on top of dam.
HIGH POOL RECORDS	No records.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None reported.
MAINTENANCE & OPERATION RECORDS	No records.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plate IV, Appendix E.

NDI NO. PA-00711

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Plate IV, Appendix E.
CONSTRUCTION RECORDS	No records.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	No reports.
MISCELLANEOUS	

NDI NO. PA-00 711

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: Woodlands.

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 486 Acre-Feet 12.9

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 491 Acre-Feet 24

MAXIMUM DESIGN POOL: Elev. 490

TOP DAM: Elev. 491

SPILLWAY:

a. Elevation 486

b. Type Uncontrolled, masonry ogee section.

c. Width 40 feet.

d. Length --

e. Location Spillover Center of dam.

f. Number and Type of Gates None.

OUTLET WORKS:

a. Type Wet well with 24-inch blowoff pipe and 8-inch water supply pipe.

b. Location Upstream toe at right side of spillway.

c. Entrance inverts 473

d. Exit inverts 472

e. Emergency drawdown facilities Valve on 24-inch blowoff pipe.

HYDROMETEOROLOGICAL GAGES:

a. Type None.

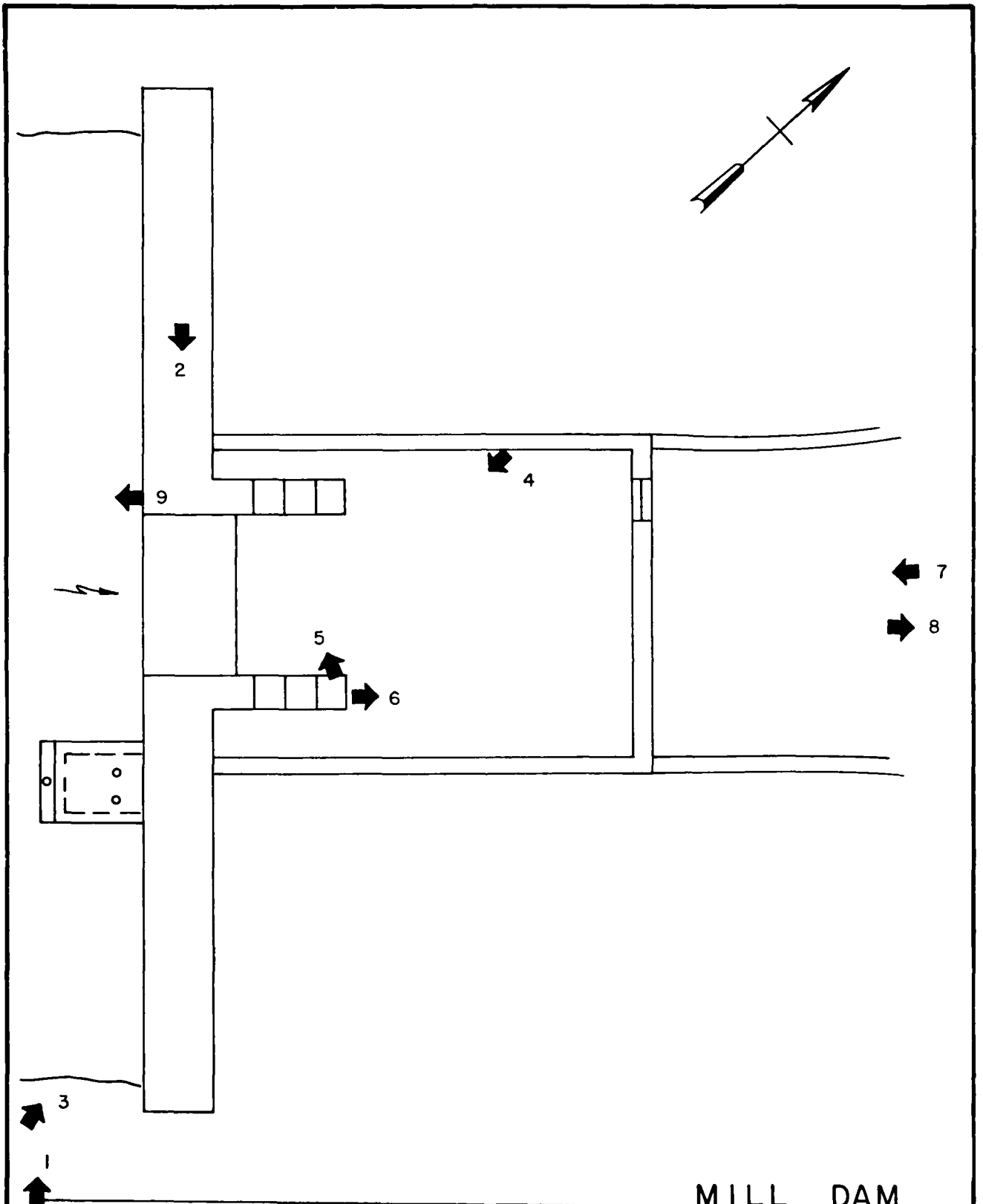
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 1735 cfs.

APPENDIX C

PHOTOGRAPHS

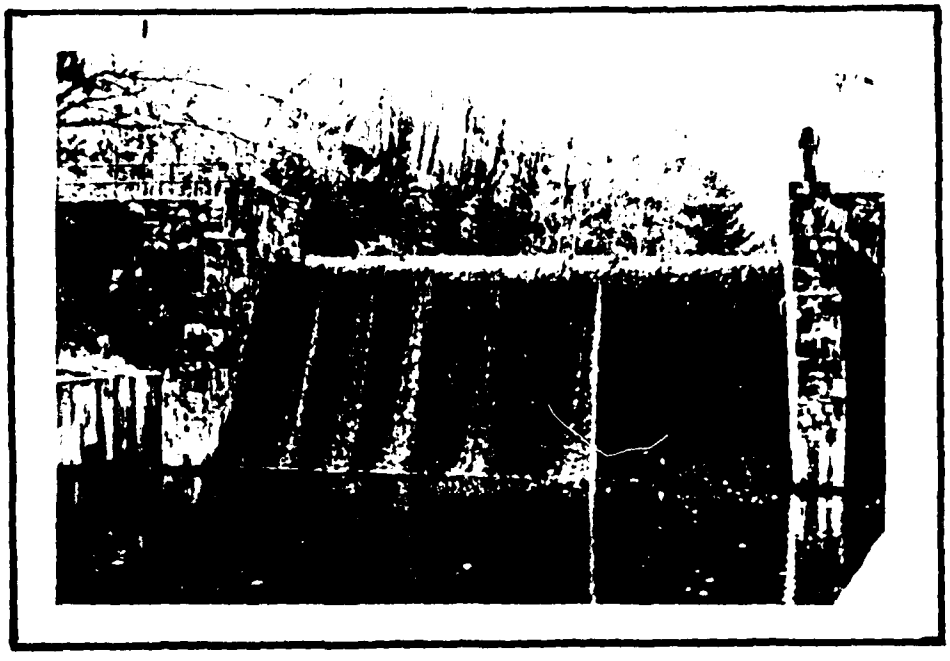


MILL DAM
PA-00711
KEY MAP OF PHOTOGRAPHS
PLATE C-I

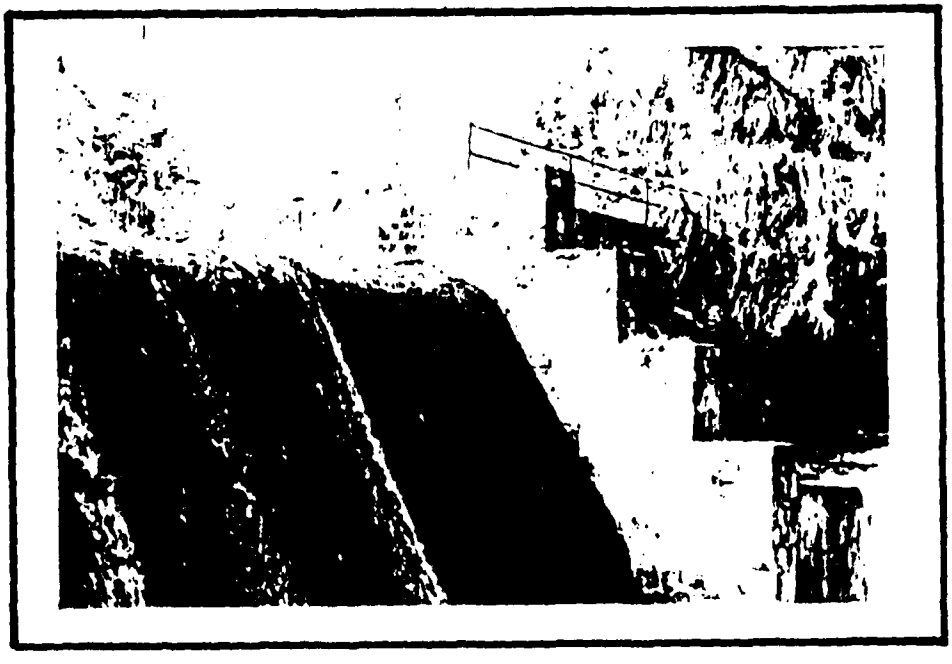
TOP VIEW FROM LEFT END - NO. 2

UPSTREAM FACE AND CONTROL STRUCTURE - NO. 3

PA-00711
Plate C-11



DOWNSTREAM FACE OF SPILLWAY - NO. 4



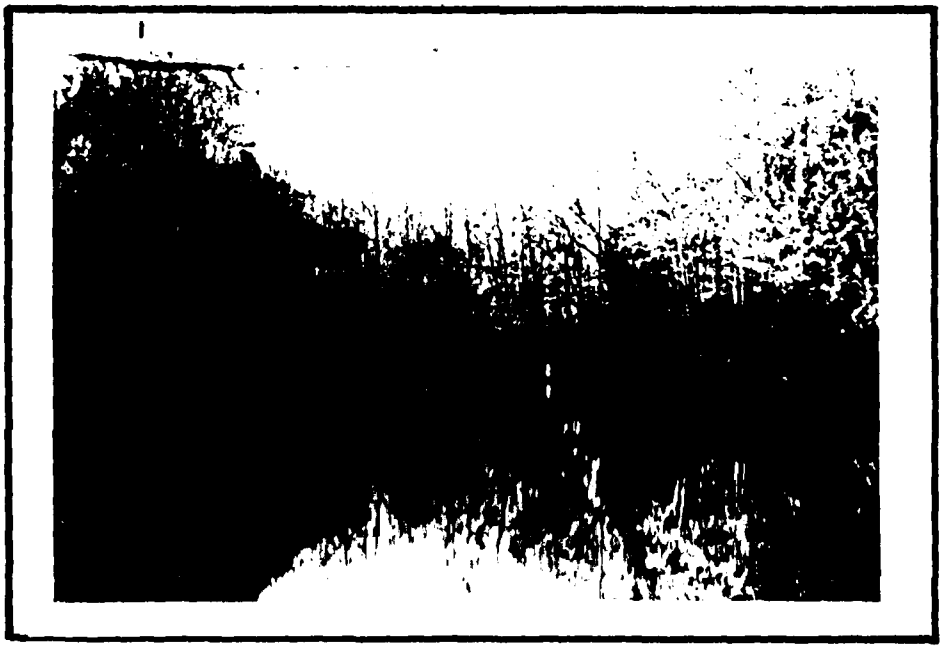
DETAIL OF LEFT SPILLWAY WALL - NO. 5

PA-00711
Plate C-III

DOWNSTREAM CHANNEL BEYOND STILLING BASIN - NO. 6
NOTE VEHICULAR BRIDGE

DOWNSTREAM CHANNEL LOOKING UPSTREAM - NO. 7

DOWNSTREAM CHANNEL BEYOND BRIDGE - NO. 8



RESERVOIR AREA - NO. 9

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

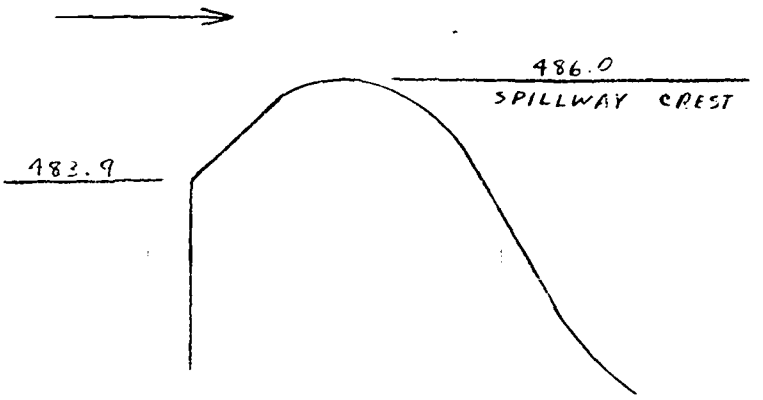
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

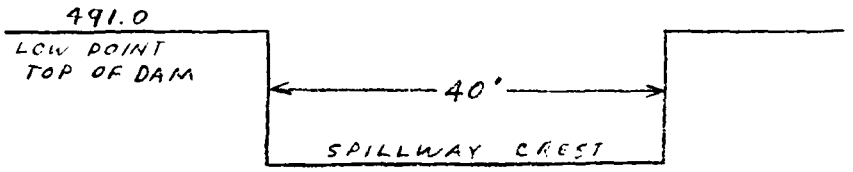
BY RLS DATE 2/18/81 | BERGER ASSOCIATES | SHEET NO. 1 OF 6
CHKD. BY ____ DATE ____ | PROJECT D0590
SUBJECT MILL DAM

SPILLWAY RATING



OGEE SECTION

C = 3.88 (SMALL DAMS, FIG. 249)



$Q = C L H^{3/2}$

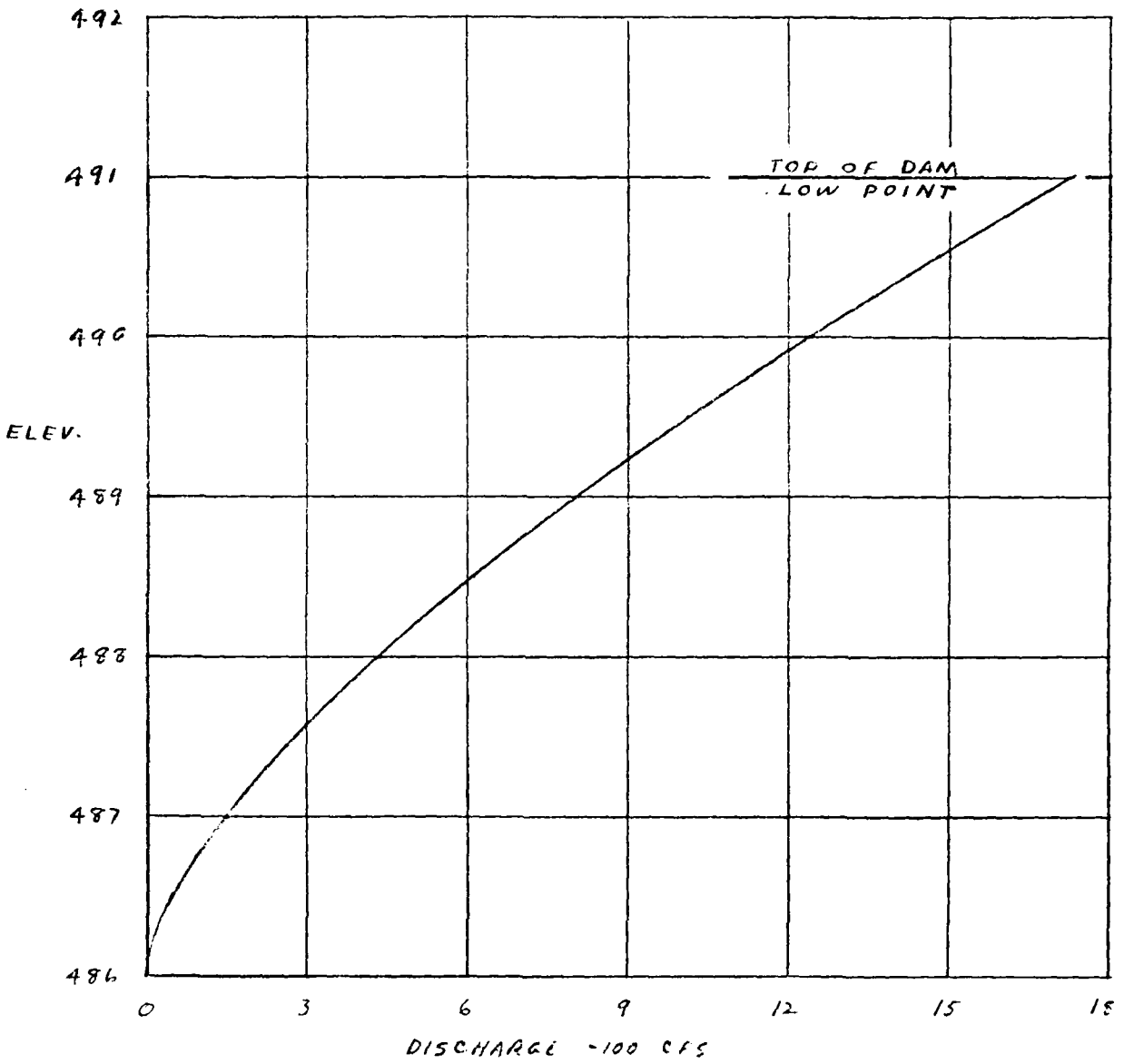
$H = 491 - 486 = 5'$

$Q = 3.88 \times 40 \times (5)^{1.5}$

$= 1735$ CFS

BY RLS DATE 2/18/81 **BERGER ASSOCIATES** SHEET NO. 2 OF 6
CHKD. BY DATE PROJECT 10590
SUBJECT MILL DAM

SPILLWAY RATING CURVE



DISCHARGE THROUGH OUTLET WORKS

24" DIAMETER BLOWOFF PIPE IN WETWELL
C = 0.6 (KING'S HDBK.)

INVERT ELEV = 470

$Q = CA\sqrt{2gH}$

AT POOL LEVEL 486

$H = 486 - 471 = 15'$

$Q = 0.6 \times \pi \times (2)^2/4 \times (2 \times 32.2 \times 15)^{0.5}$

$= 59$ CFS

AT LOW POOL LEVEL 476

$H = 476 - 471 = 5'$

$Q = 0.6 \times \pi \times (2)^2/4 \times (2 \times 32.2 \times 5)^{0.5}$

$= 34$ CFS

BY RLS DATE 2/19/81 BERGER ASSOCIATES SHEET NO. 4 OF 6
CHKD. BY DATE PROJECT D0590
SUBJECT MILL DAM

EMBANKMENT RATING

TOP OF DAM C = 2.7 (KINGS HDBK.)

$Q = C L H^{3/2}$

AT ELEV 491.2

$2.7 \times 108 \times (.2)^{1.5} = 26$
$2.7 \times 1 \times (.1)^{1.5} = -$
$2.7 \times 101 \times (.1)^{1.5} = 9$
$2.7 \times 1 \times (.05)^{1.5} = -$ $\Sigma = 35$ CFS

AT ELEV 491.5

$2.7 \times 108 \times (.5)^{1.5} = 103$
$2.7 \times 1 \times (.25)^{1.5} = -$
$2.7 \times 101 \times (.4)^{1.5} = 69$
$2.7 \times 4 \times (.2)^{1.5} = 1$ $\Sigma = 173$ CFS

AT ELEV 492

$2.7 \times 108 \times (1)^{1.5} = 292$
$2.7 \times 2 \times (.5)^{1.5} = 2$
$2.7 \times 101 \times (.9)^{1.5} = 233$
$2.7 \times 5 \times (.45)^{1.5} = 7$ $\Sigma = 534$ CFS

AT ELEV 492.5

$2.7 \times 108 \times (1.5)^{1.5} = 536$
$2.7 \times 4 \times (.75)^{1.5} = 7$
$2.7 \times 101 \times (1.4)^{1.5} = 452$
$2.7 \times 13 \times (.7)^{1.5} = 21$ $\Sigma = 1016$ CFS

AT ELEV 493

$2.7 \times 108 \times (2)^{1.5} = 525$
$2.7 \times 4 \times (1.15)^{1.5} = 13$
$2.7 \times 101 \times (1.9)^{1.5} = 714$
$2.7 \times 17 \times (.95)^{1.5} = 43$ $\Sigma = 1595$

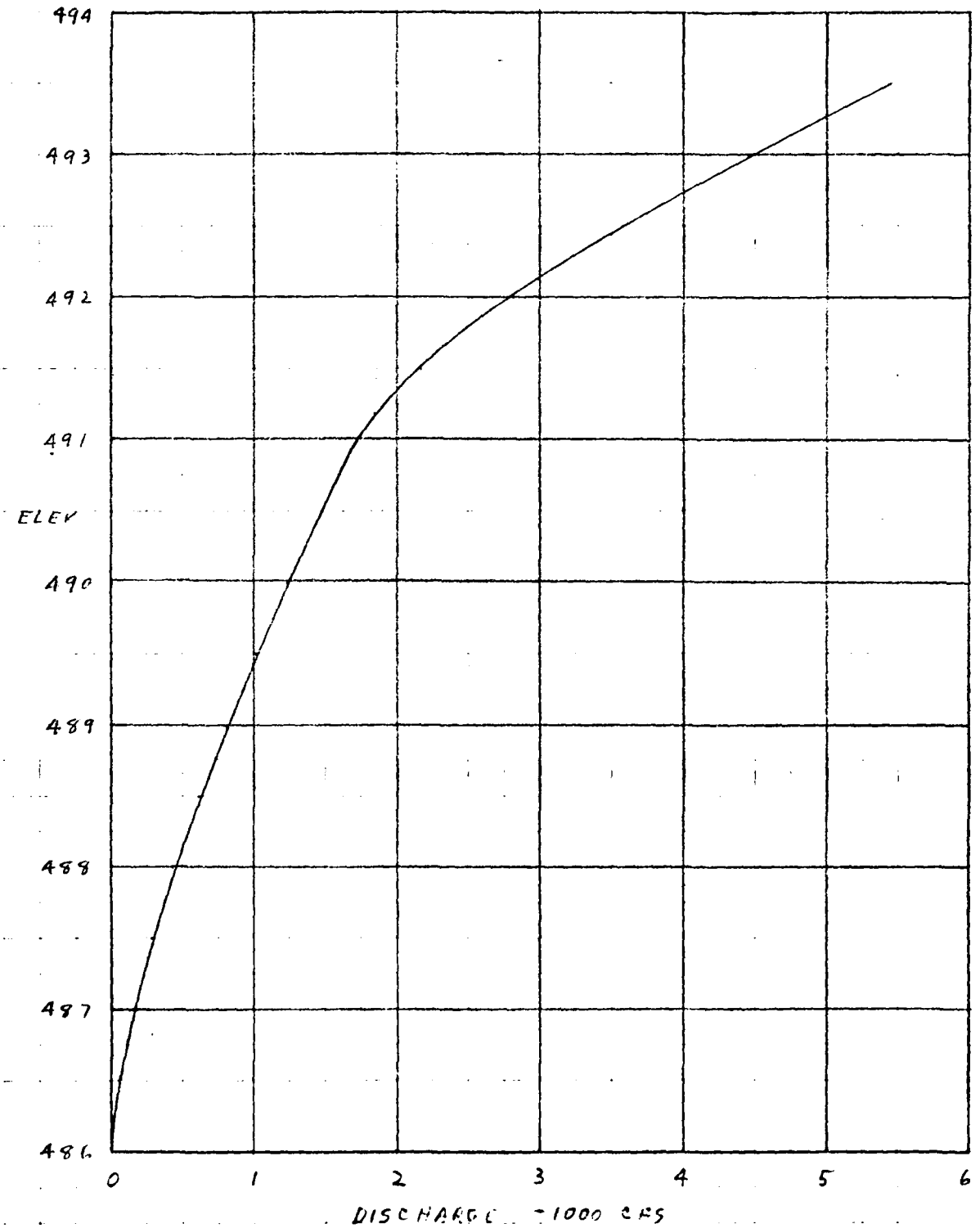
AT ELEV 493.5 $\Sigma = 2270$

BY KCS DATE 5/26/81 **BERGER ASSOCIATES** SHEET NO. 4A OF 6

CHKD. BY DATE PROJECT 6025

SUBJECT MILL DAM

DISCHARGE RATING CURVE



MAXIMUM KNOWN FLOOD AT DAMSITE

THERE ARE NO RECORDS OF POOL LEVELS FOR THIS DAM. BASED ON THE RECORDS OF THE GAGING STATION FOR STONEY RUN AT NEARBY REAMSTOWN, PA. (D.A. = 3.55 SQ.MI.) THE MAXIMUM DISCHARGE AT THE GAGE OCCURRED IN JUNE 1972 WHEN A DISCHARGE OF 995 CFS WAS OBSERVED. THE MAXIMUM INFLOW TO MILL DAM IS ESTIMATED TO BE:

$$Q = \left(\frac{2.52}{3.55}\right)^{0.8} \times 995$$

$$= 756 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION

MAXIMUM STORAGE = 24 ACRE-FEET
MAXIMUM HEIGHT = 23 FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

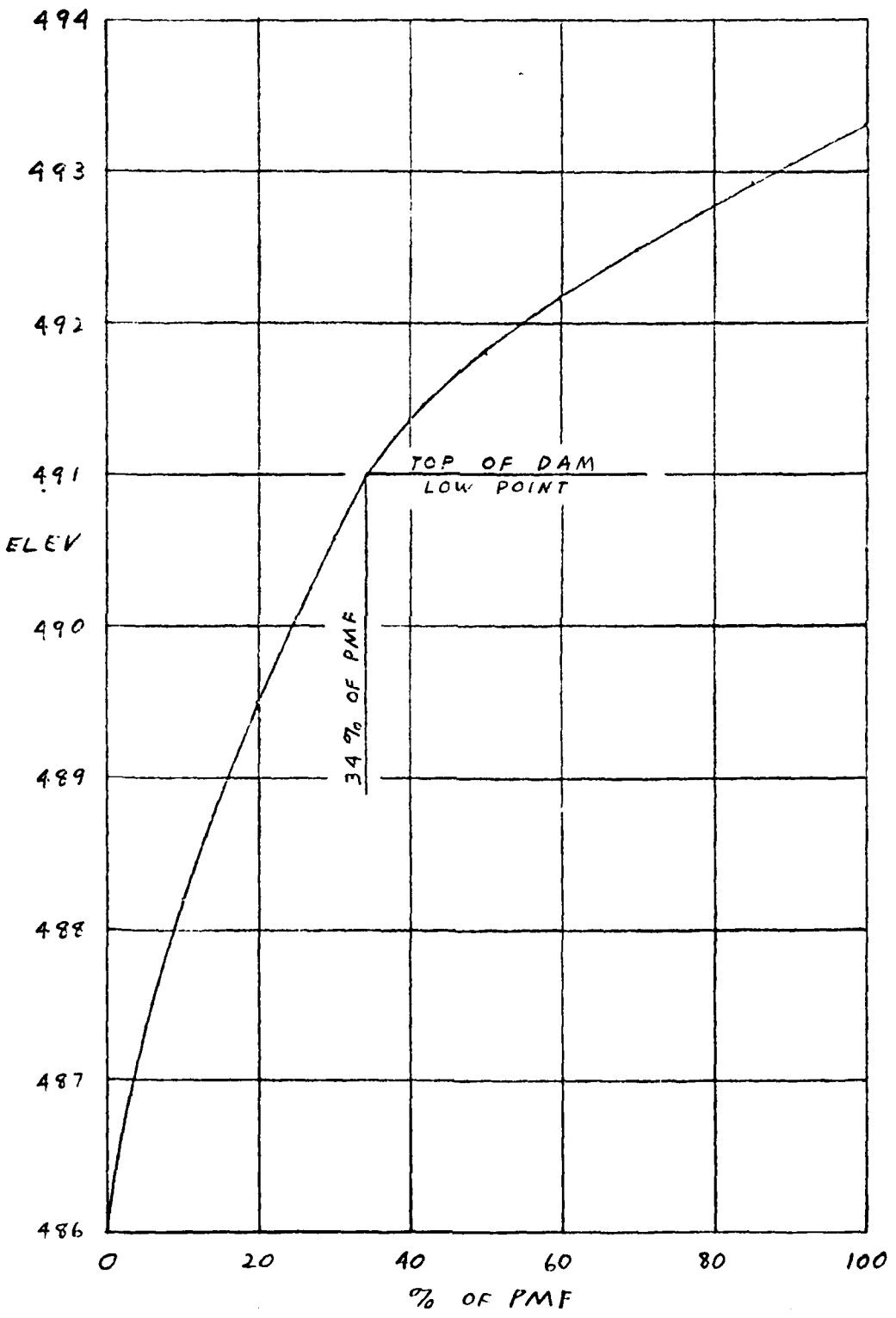
HOSPITAL IS LOCATED JUST DOWNSTREAM OF THE DAM.
USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF IN THE RANGE OF ONE-HALF PMF TO THE PROBABLE MAXIMUM FLOOD.

BY RLS DATE 2/20/81 **BERGER ASSOCIATES** SHEET NO. 6 OF 6
CHKD. BY DATE PROJECT D0590
SUBJECT MILL DAM

SPILLWAY CAPACITY CURVE.



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Mill Dam RIVER BASIN: Delaware

PROBABLE MAXIMUM PRECIPITATION (PMP) = 23.2 INCHES/24 HOURS (1)

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		MILL DAM RESERVOIR	MILL DAM		
DRAINAGE AREA (SQUARE MILES)		2.52			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		2.52	2.52		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%) (2)	6 HOURS	113			
	12 HOURS	123			
	24 HOURS	132			
	48 HOURS	143			
	72 HOURS Zone 6				
SNYDER HYDROGRAPH PARAMETERS	ZONE (3)	6			
	C_p / C_t (4)	.40/1.35			
	L (MILES) (5)	2.62			
	L_{ca} (MILES) (5)	1.11			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (Hours)	1.86			
SPILLWAY DATA	CREST LENGTH (FT.)		40		
	FREEBOARD (FT.)		5		
	DISCHARGE COEFFICIENT		3.88		
	EXPONENT		1.5		
	ELEVATION		486		
AREA (6) (ACRES)	NORMAL POOL (486)	1.6			
	ELEV. 500	6.2			
	ELEV.				
STORAGE (ACRE-FEET)	NORMAL POOL (7)	12.9			
	ELEV. 461.8 (8)	0			
	ELEV. (8)				
	ELEV. (8)				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.

L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

(6) Planimetered area encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  01 APR 80
**********
```

```
    1             A1      MILL DAM    ####    HOSPITAL CREEK
    2             A2      SOUTH HEIDELBERG TWP., BERKS COUNTY, PA.
    3             A3      NDI # PA-00711      PA DER # 6-295
    4             B    300      0      15       0       0       0       0       0      -4       0
    5             B1     5
    6             J      1      9       1
    7             J1     1    .85     .7      .6      .5      .4      .3      .2      .1
    8             K             1                                      1
    9             K1              INFLOW  HYDROGRAPH
   10             M      1       1    2.52
   11             P             23.2    113     123     132     143
   12             T                                                    1     .05
   13             W    1.86     .40
   14             X    -1.5    -.05       2
   15             K      1       2                                      1
   16             K1              RESERVOIR  ROUTING
   17             Y                              1
   18             Y1     1                                                    12.9      -1
   19             Y4   486   486.5     487   487.5     488   488.5     489   489.5     490   490.5
   20             Y4   491   491.2   491.5     492   492.5     493   493.5
   21             Y5     0      54     155     285     439     613     806    1016    1242    1482
   22             Y5  1735    1875    2175    2815    3588    4469    5458
   23             $A     0     1.6     6.2
   24             $E 461.8     486     500
   25             $$   486
   26             $D   491
   27             K     99
```

```
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK
```

```
1**********
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
   LAST MODIFICATION  01 APR 80
 **********

 RUN  DATE# 81/02/20.
      TIME# 05.04.20.
```

MILL DAM #### HOSPITAL CREEK
SOUTH HEIDELBERG TWP., BERKS COUNTY, PA.
NDI # PA-00711 PA DER # 6-295

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS=	1.00	.85	.70	.60	.50	.40	.30	.20	.10

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.52	0.00	2.52	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	23.20	113.00	123.00	132.00	143.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.86 CP= .40 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 79 END-OF-PERIOD ORDINATES, LAG= 1.85 HOURS, CP= .40 VOL= 1.00

15.	55.	114.	182.	250.	306.	342.	352.	337.	314.
292.	272.	253.	236.	219.	204.	190.	177.	165.	154.
143.	133.	124.	115.	107.	100.	93.	87.	81.	75.
70.	65.	61.	56.	53.	49.	46.	42.	40.	37.
34.	32.	30.	28.	26.	24.	22.	21.	19.	18.
17.	16.	15.	14.	13.	12.	11.	10.	9.	9.
8.	8.	7.	7.	6.	6.	5.	5.	5.	4.
4.	4.	3.	3.	3.	3.	3.	2.	2.	

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	26.54	24.13	2.41	156945.
										(674.)(613.)(61.)(4444.19)			

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	13.	-1

STAGE	486.00	486.50	487.00	487.50	488.00	488.50	489.00	489.50	490.00	490.50
	491.00	491.20	491.50	492.00	492.50	493.00	493.50			
FLOW	0.00	54.00	155.00	285.00	439.00	613.00	806.00	1016.00	1242.00	1482.00
	1735.00	1875.00	2175.00	2815.00	3588.00	4469.00	5458.00			

SURFACE AREA=	0.	2.	6.
CAPACITY=	0.	13.	64.
ELEVATION=	462.	486.	500.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
486.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
491.0	0.0	0.0	0.

PEAK OUTFLOW IS 5088. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 4322. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 3561. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 3053. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 2545. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 2036. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1527. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1018. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 509. AT TIME 41.75 HOURS

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .85	RATIO 3 .70	RATIO 4 .60	RATIO 5 .50	RATIO 6 .40	RATIO 7 .30	RATIO 8 .20	RATIO 9 .10
HYDROGRAPH AT	1	2.52	1	5083.	4321.	3558.	3050.	2542.	2033.	1525.	1017.	508.
	(	6.53)	(	143.95)(	122.36)(	100.76)(	86.37)(	71.97)(	57.58)(	43.18)(	28.79)(	14.39)
ROUTED TO	2	2.52	1	5088.	4322.	3561.	3053.	2545.	2036.	1527.	1018.	509.
	(	6.53)	(	144.08)(	122.39)(	100.84)(	86.46)(	72.07)(	57.66)(	43.23)(	28.82)(	14.41)

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

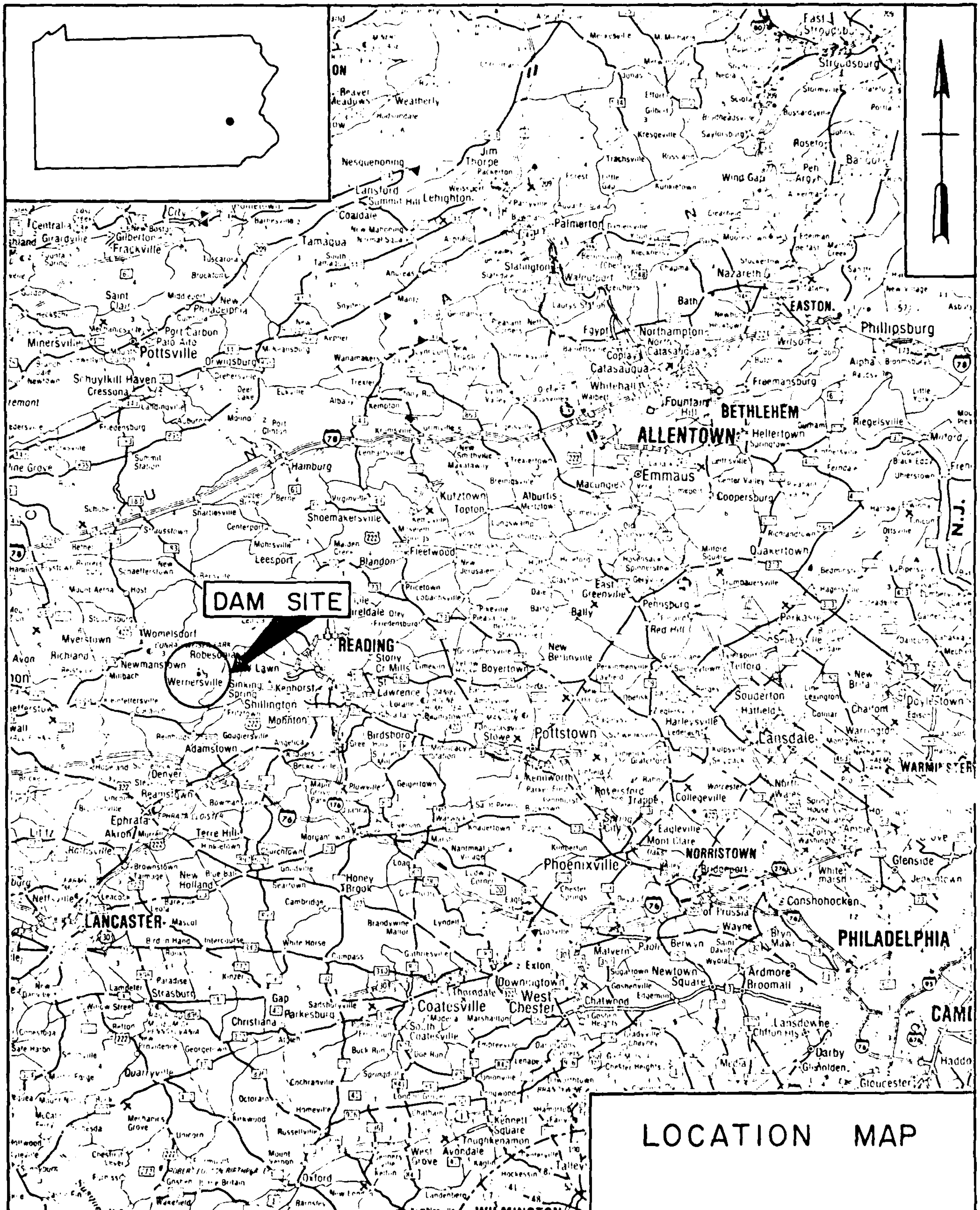
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	485.99	486.00	491.00
STORAGE	13.	13.	24.
OUTFLOW	0.	0.	1735.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	493.31	2.31	32.	5088.	8.00	41.75	0.00
.85	492.92	1.92	30.	4322.	6.75	41.75	0.00
.70	492.48	1.48	29.	3561.	5.50	41.75	0.00
.60	492.15	1.15	28.	3053.	4.75	41.75	0.00
.50	491.79	.79	26.	2545.	3.75	41.75	0.00
.40	491.36	.36	25.	2036.	2.50	41.75	0.00
.30	490.59	0.00	23.	1527.	0.00	41.75	0.00
.20	489.50	0.00	20.	1018.	0.00	41.75	0.00
.10	488.20	0.00	17.	509.	0.00	41.75	0.00

EOI ENCOUNTERED.
N>

APPENDIX E

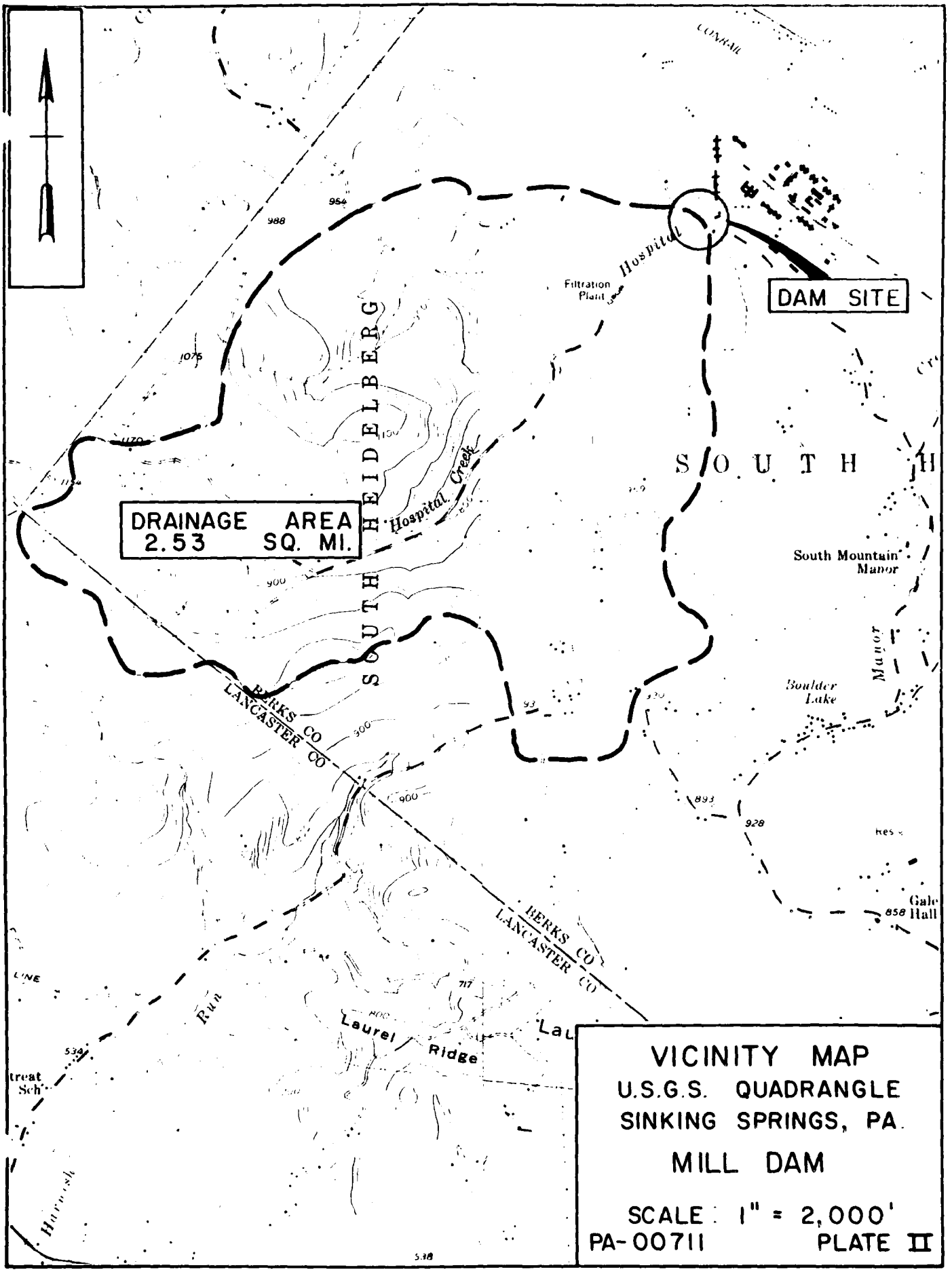
PLATES



LOCATION MAP

MILL DAM

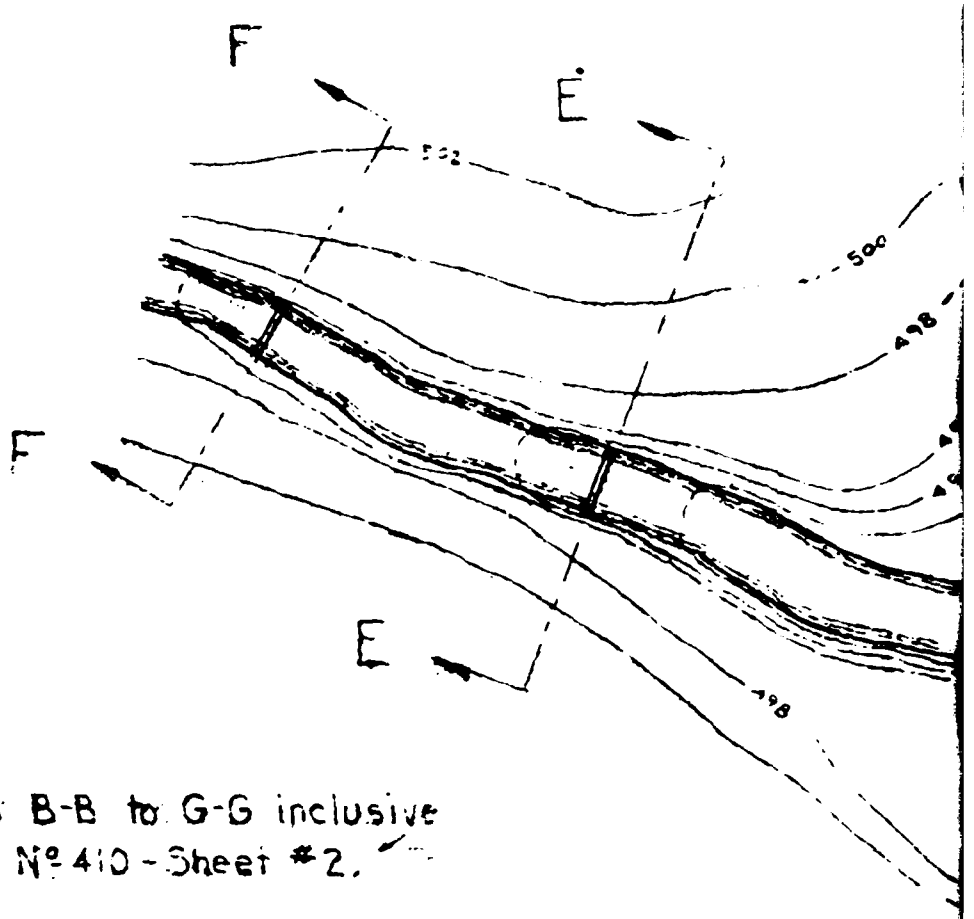
PA-00711 PLATE I



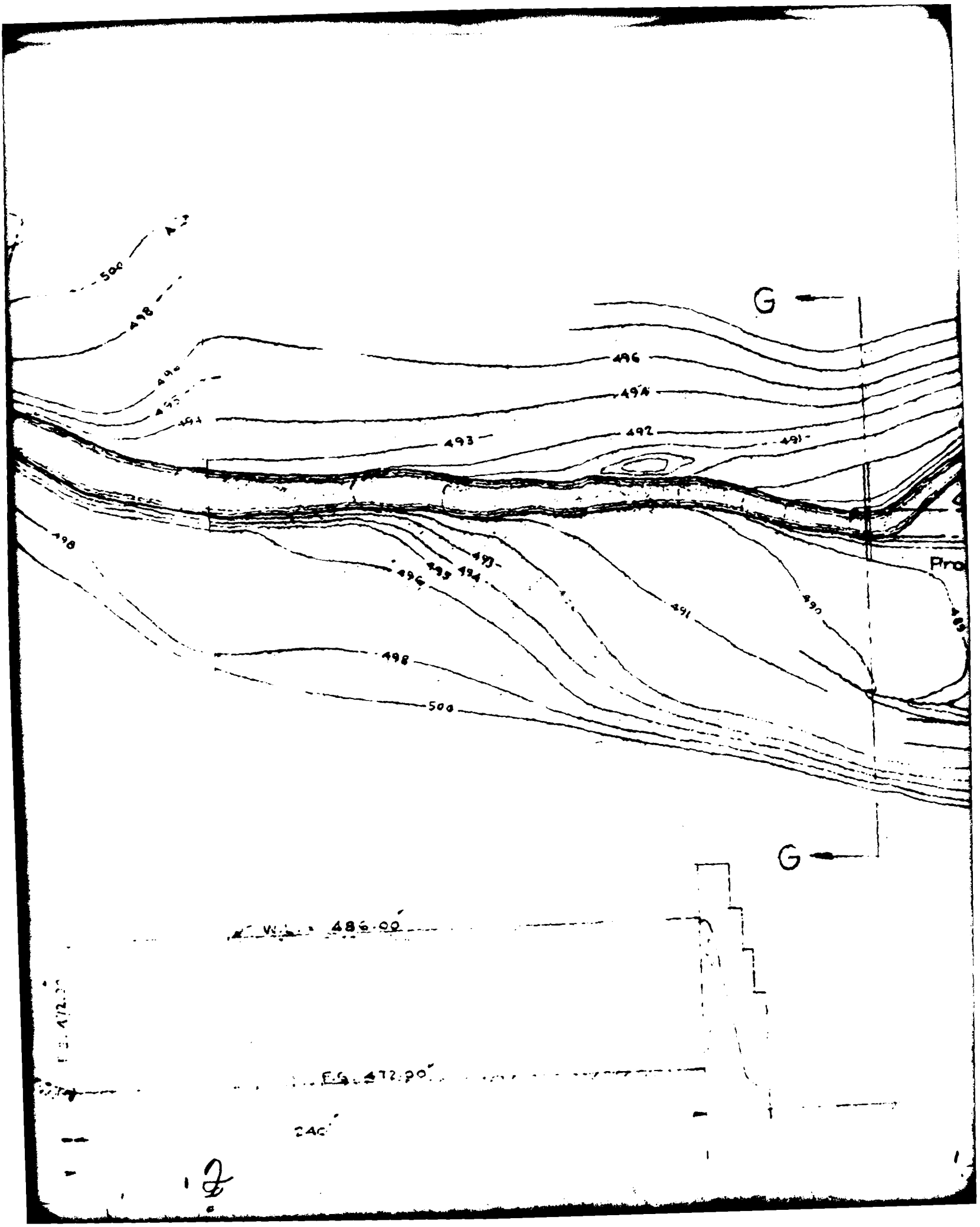
VICINITY MAP
U.S.G.S. QUADRANGLE
SINKING SPRINGS, PA.
MILL DAM

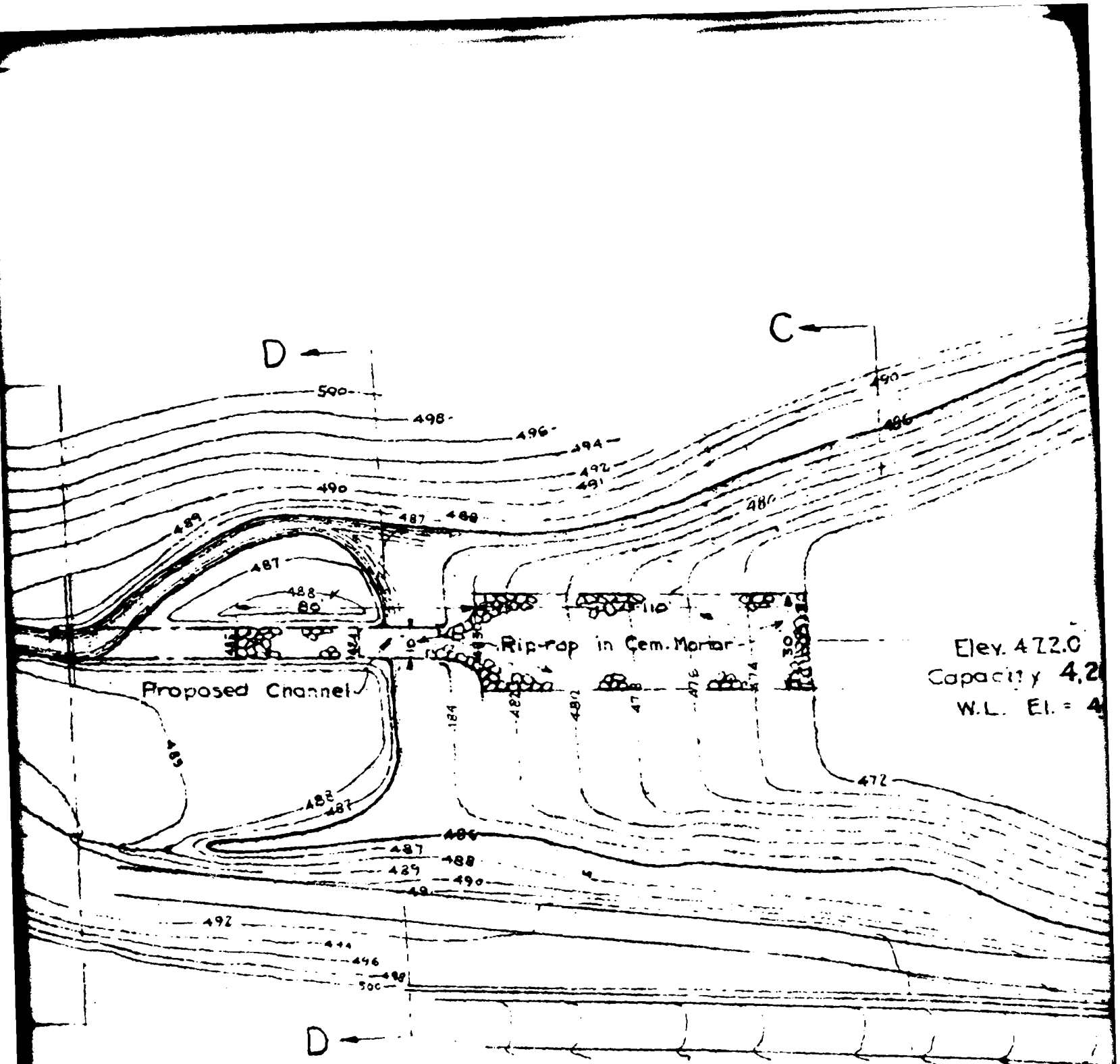
SCALE: 1" = 2,000'

PA-00711 PLATE II



NOTE:- For Sections B-B to G-G inclusive see Drawing Nº 410 - Sheet #2.

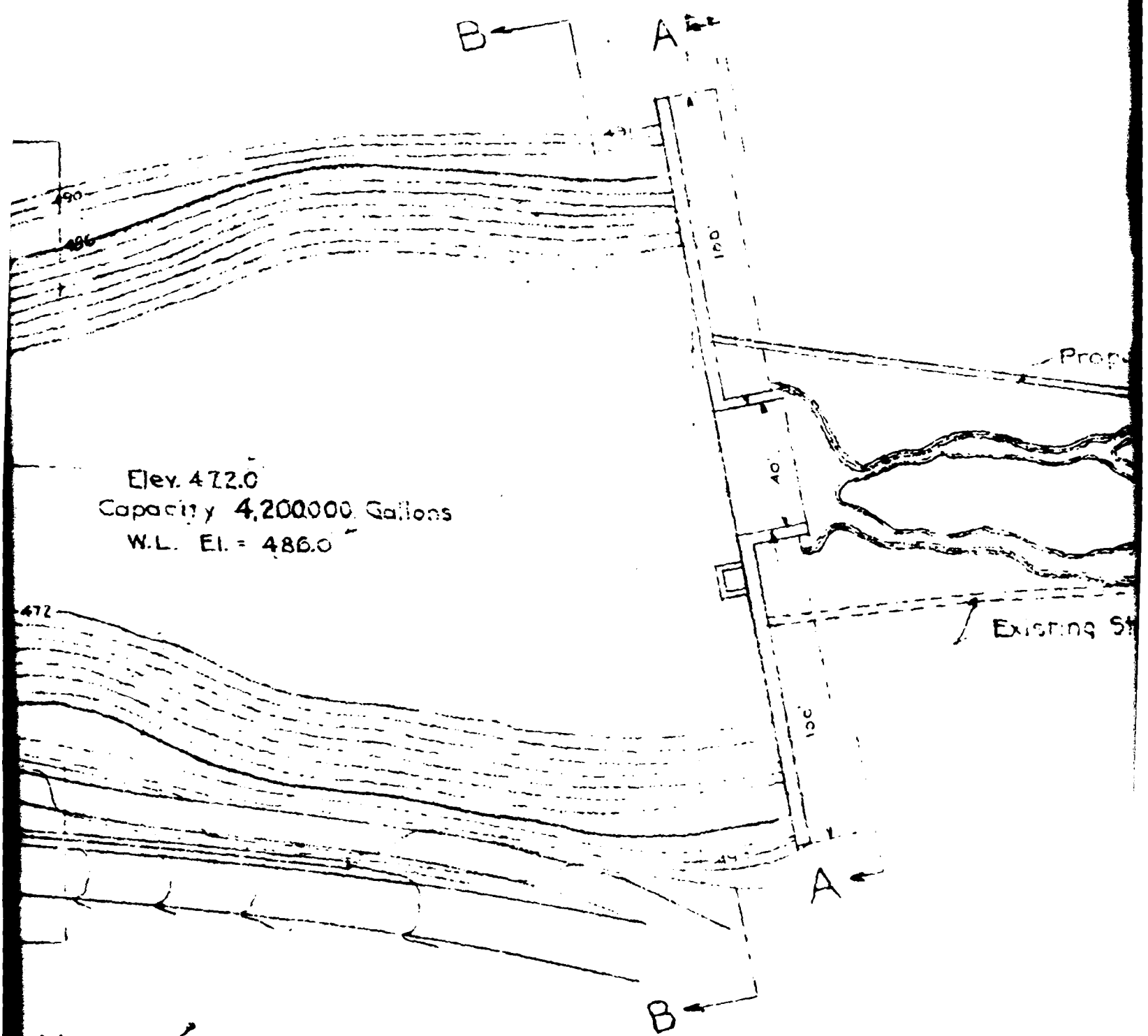

G
500
498
496
494
493
492
491
490
G
W.S. 486.00
E.S. 472.00



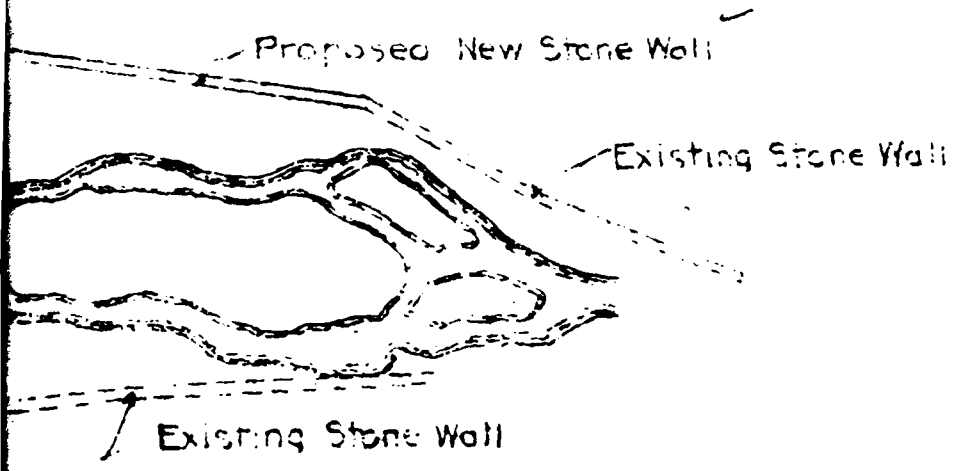
PLAN OF PROPOSED DAM

SCALE: 1" = 40'

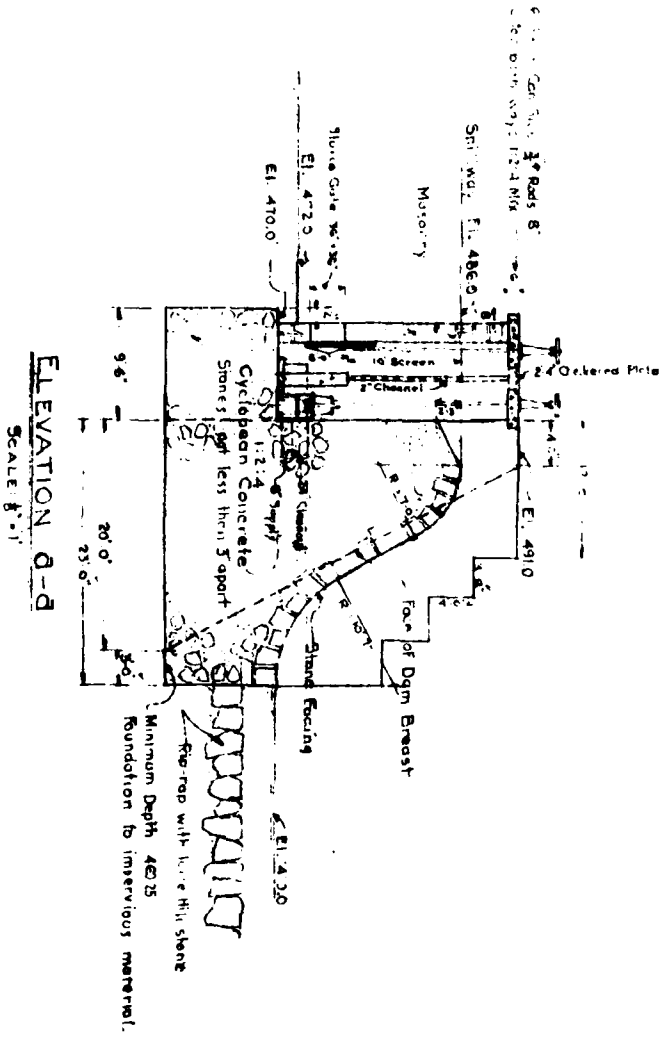
13


B
A
490
486
100
Prop
Elev. 472.0
Capacity 4,200000 Gallons
W.L. El. = 486.0
40
472
Existing St
100
A
B
M

4

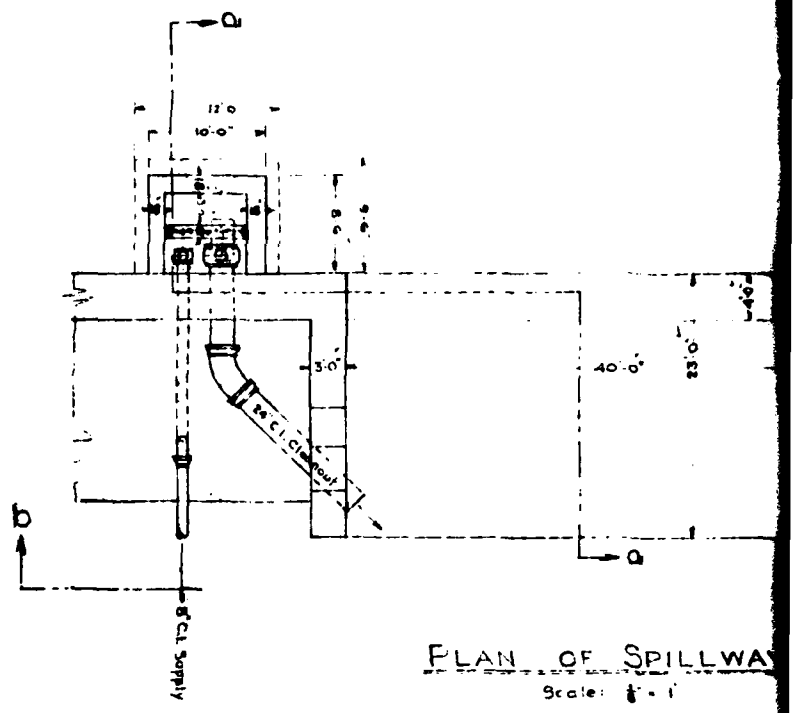


PA-00711
PLATE III



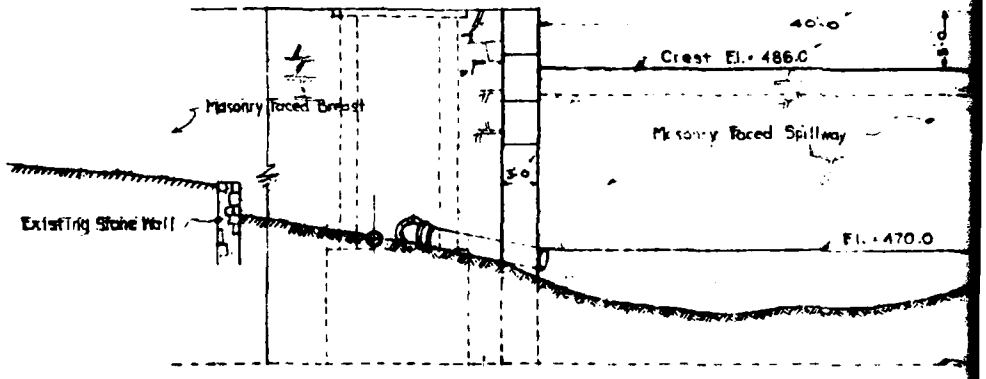
ELEVATION a-a

SCALE 1" = 1'



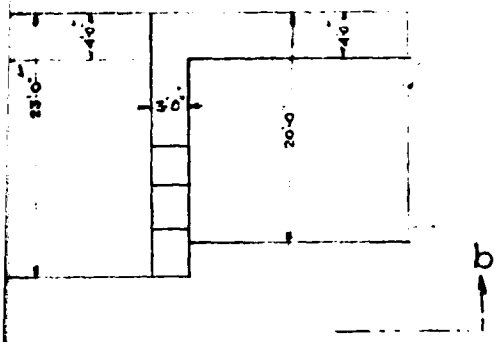
PLAN OF SPILLWA

Scale: 1" = 1'

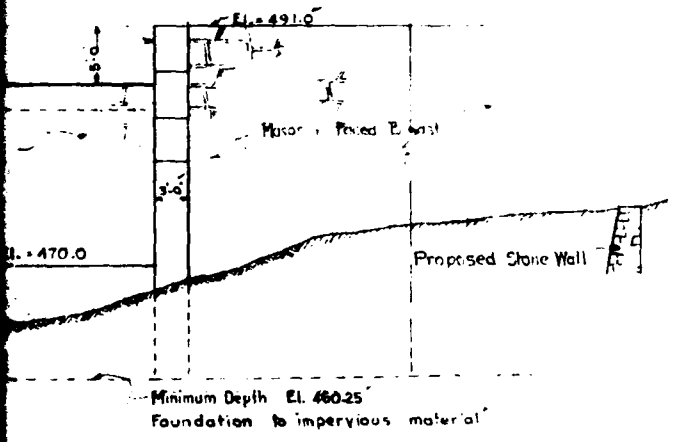


ELEVATION b-b

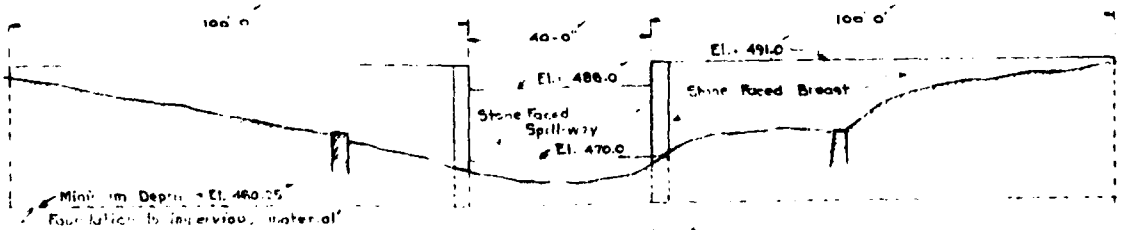
Scale: 1" = 1'



ILLWAY



b-b



ELEVATION A-A

Scale 1"=20'

PA-00711
PLATE IV

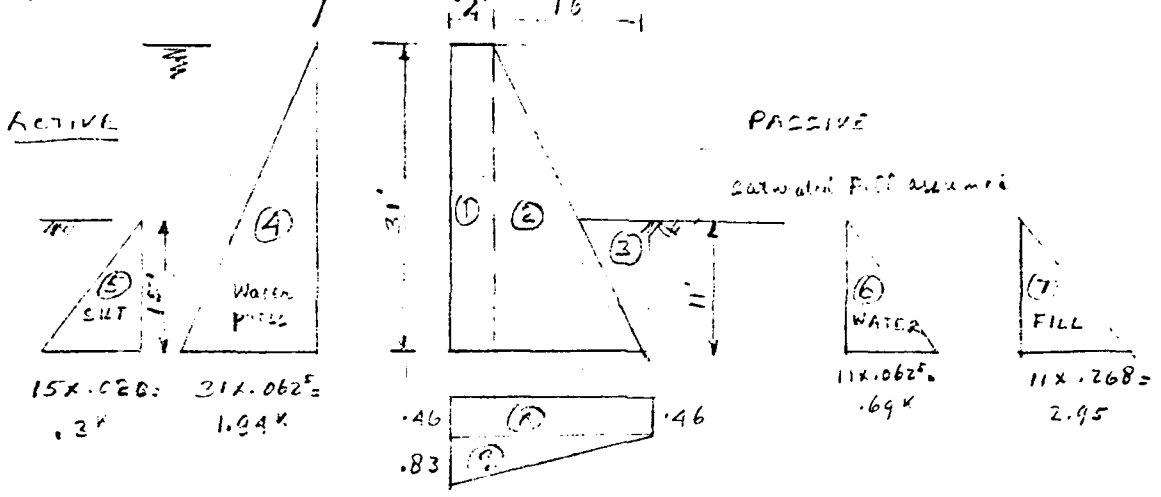
12

APPENDIX F

GEOLOGIC REPORT

BY DLF DATE 5/81 | BERGER ASSOCIATES | SHEET NO. 1 OF
CHKD. BY DATE MILL DAM PA - 00711 PROJECT D0590
SUBJECT

Check Stability Dam



(1)	4 x 21 x .150	=	18.6 ↓ x (2+16)	=	335 ↶
(2)	½ x 16 x 21 x .150	=	37.2 ↓ x ⅔ x 16	=	397 ↶
(3)	½ x 11 x 5.5 x .132	=	4.0 ↓ x 5.5/3	=	7 ↶
(8)	.46 x 20	=	9.2 ↑ x 10	=	92 ↷
(9)	½ x .83 x 20	=	8.3 ↑ x ⅔ x 20	=	111 ↷
		ΣV =	42.3		536 ↶ (739 - 203)

(4)	½ x 1.94 x 31	= 30.1 →	x 31/3	=	311 ↷
(5)	½ x .3 x 15	= 2.2 →	x 5	=	11 ↷
(6)	½ x .69 x 11	= 3.8 ←	x 11/3	=	14 ↙
(7)	½ x 2.95 x 11	= 16.2 ←	x 11/3	=	59 ↙
	ΣH	12.3 →			249 ↷ (73 - 322)

$$\frac{\Sigma H}{\Sigma V} = \frac{12.3}{42.3} = .29$$

$$\frac{\Sigma M \text{ ↶}}{\Sigma M \text{ ↷}} = \frac{739+73}{203+322} = \frac{812}{525} = 1.55 \quad OK$$

$$\frac{\Sigma M}{\Sigma V} = \frac{812-525}{42.3} = 6.78' > \frac{20}{3} = 6.67' \quad OK$$

$$p_{max} = \frac{42.3}{20} \pm \frac{42.3 \times 3.22 \times 6}{20^2} \simeq 2.11 \pm 2.04 = 4.15 \text{ \& } .07 \text{ K/L}'$$

GEOLOGIC REPORT

BEDROCK - DAM AND RESERVOIR

The bedrock in this area consists of a light buff to light pink, fine to medium grained, granite gneiss. The essential minerals are quartz, microline, hornblende (5-10%) and occasionally biotite. These rocks are extremely resistant to weathering.

STRUCTURE

There is an approximate thrust fault striking in the same direction as the dam, in the proximity of the dam. Jointing is moderately to poorly developed and the dip is 45° to vertical.

OVERBURDEN

Overburden in this area most probably consists of a shallow residual soil.

AQUIFER CHARACTERISTICS

The granite gneiss has an extremely low primary porosity and a very low secondary porosity and subsurface seepage from within the formation should be of little concern. However, with the possible existence of a thrust fault, groundwater movement in the vicinity of the fault is a distinct possibility.

DISCUSSION

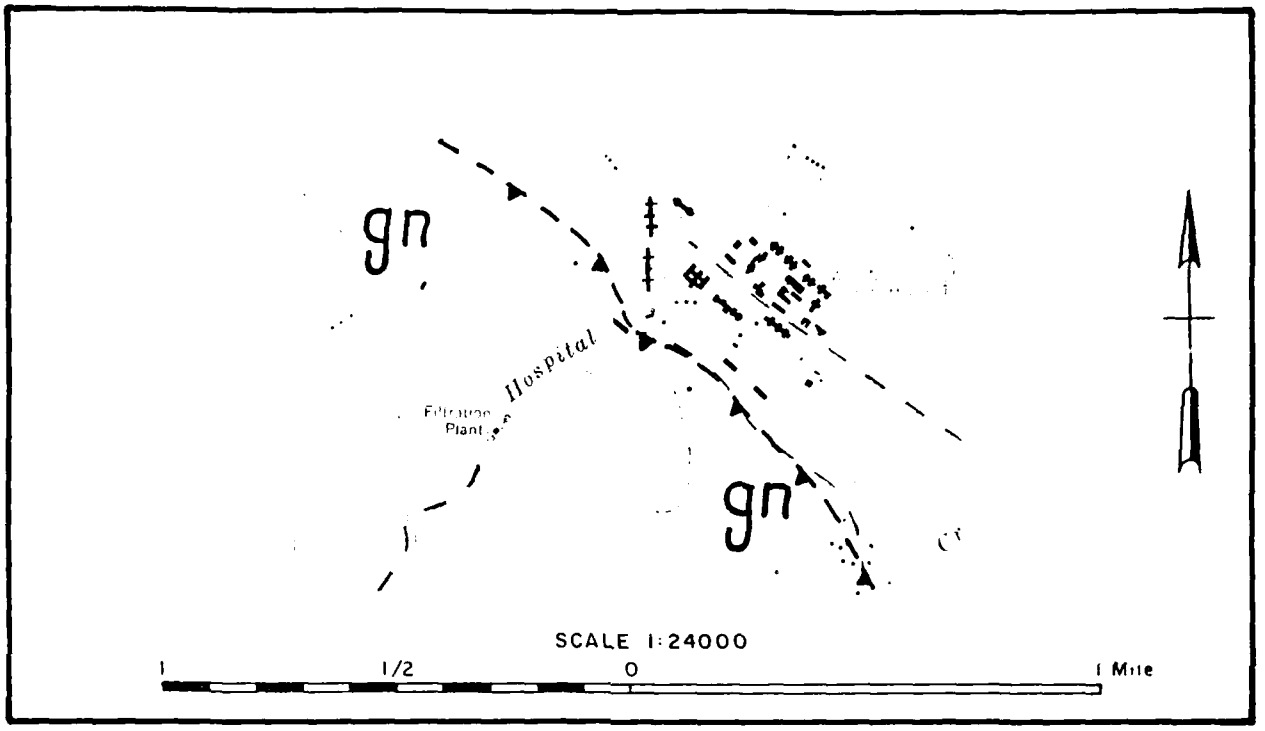
According to the available construction plans, the dam apparently rests on impervious material. If such is the case, the granite gneiss provides a fair quality foundation for heavy structures.

SOURCES OF INFORMATION

1. MacLachlan, D.B., et. al., 1975. Geology and Mineral Resources of the Sinking Springs Quadrangle, Berks and Lancaster Counties, Pennsylvania: Pennsylvania Geological Survey A-177d.

2. McGlade, W.G., 1972. Engineering Characteristics of the Rocks of Pennsylvania: Pennsylvania Geological Survey EG-1.

GEOLOGIC MAP - MILL DAM



LEGEND

gn — Granite Gneiss

▼ — — ▼ Approximate Thrust Fault